

## **Arachnids in Mediterranean protected areas of Egypt**

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### **Abstract**

This is a preliminary study of four orders of class Arachnida, i.e. Araneida, Pseudoscorpionida, Scorpionida and Solpugida, in four Egyptian protected areas on the Mediterranean Sea, i.e. Omayed, Burullus, Zaranik and Ahrash [Rafah] protectorates. Scattered collecting sites were randomly chosen in every protectorate. Several taxa were identified, mostly of spiders (27 species and 36 genera of 27 families), followed by six scorpion species and a minority of pseudoscorpions and sun-spiders. There were many unidentifiable species and genera. The studied areas need a seasonal survey and more detailed studies. An ethological observation on the cannibalism in the scorpion *Androctonus australis* is included.

**Keywords:** Arachnida, Spiders, Scorpions, Pseudoscorpions, Sun-spiders, Protected areas, Mediterranean, Egypt.

### **Introduction**

Most studies in protected areas in the world are devoted to vertebrate animals. Invertebrate animals are mostly neglected, in spite of their huge number of species/individuals and their great influence on the surrounding habitats. Arachnids, especially spiders, constitute a considerable ratio of invertebrates with great ecological importance. They have a very important role, as predators, in biological balance.

A preliminary study of arachnids in four protected areas on the Mediterranean sea had been achieved during 2000-2004. It is not a survey of every living species in these areas. The recorded species may be the most common species. This study was preceded by a similar study on protected areas on Aqaba gulf (El-Hennawy, 2003).

Identification of spiders is very difficult in a poorly studied arachno-fauna as in Egypt. Juvenile specimens are useless and unidentifiable, even to genus level. In few cases, individual juvenile spiders were kept alive until they reached maturity and became identifiable. The brief description of each of the four protectorates is adopted from MSEA (2001) and Rashid (2002).



Map 1. Mediterranean protected areas of Egypt. 1 = Omayed, 2 = Burullus, 3 = Zaranik, 4 = Ahrash [in Rafah].

## Methods

A preliminary survey of spiders, scorpions, pseudoscorpions and sun-spiders had been achieved in four protected areas on the Mediterranean Sea (El-Omayed, El-Burullus, El-Zaranik and El-Ahrash [Rafah] Protectorates) during 2000-2004 (Map 1). The four areas were unequally visited. El-Omayed was visited twice; 15-18 August 2000 and 8-11 October 2000. El-Burullus was visited once; 3-8 September 2000. El-Zaranik was visited ten times; 9-12 August 2000, 2-5 October 2000, 5-8 November 2000, 3-6 July 2001, 24-27 October 2001, 11 November 2001, 13-16 September 2002, 4-7 May 2003, 23-26 April 2004, and 1-4 June 2004. El-Ahrash was visited twice; 7 November 2000 and 25 October 2001.

Different sites were selected and surveyed as scattered places in each protectorate. The aim was to discover different areas and habitats and to know what species are there existing. Those sites are mentioned with their longitudes and latitudes, and sometimes the altitude, in the 'Results' section before the tables of collected spider specimens.

The collecting methods were: 1. Collecting with the hands, 2. Pitfall trapping, 3. Light attracting, 4. Beating net, 5. Sweeping net, and 6. Ultra-Violet light collecting for scorpions. The identification of specimens was executed in the light of the available taxonomical knowledge, taking in consideration that the group of Arachnida is poorly studied in this geographical area. Indeed, it is the first study of arachnids in the Mediterranean protected areas of Egypt.

## Results

Results are here arranged within smaller sections, each deal with the spiders, scorpions, pseudoscorpions and sun-spiders of one protected area. A list of identified spider species, alphabetically arranged, is presented at the 'Discussion' section with authors and dates to avoid mentioning them inside the tables.

### A. Omayed protectorate

El-Omayed was declared as protected area by the Prime Ministerial Decree No. 671 for 1986, adjusted by Prime Ministerial Decree No. 90 for 1996. Its area is about 700 km<sup>2</sup>. Type: Desert area and vital peripheral.

The Omayed protected area encompasses a very small segment of the Mediterranean coastal desert of Egypt, a distinct habitat type and one of the richest terrestrial biological diversity in Egypt. This is the only protected area encompassing this habitat type in Egypt, and includes biological components not found in other protected

areas in the country. The area has a high floral diversity and a good vegetation cover. There are around 170 species of wild plants growing in different ecosystems, on sand dunes and among inland hills. About 70 species of them can be used for medical and therapeutical purposes like squall, wormwood, plantain and sorrel. There are also 60 species that can be used for different purposes including fuel like buckthorn and boxthorn, as source of oils like Ghoul Henna, for landscaping like Dirs Eshshayib, for manufacturing ropes and roofs like reed, and for pasturing like Tafwa. There are about 40 species of plants that have important environmental roles such as detaining sand and building new layers. A very rich fauna is also present, including several endangered, endemic and restricted range species. Important faunal elements include the endangered Four-toed Jerboa *Allactaga tetradactyla*, the endemic Pallid Gerbil *Gerbillus perpallidus*. There are also 14 species of wild birds recorded from the area. The endangered Egyptian Tortoise *Testudo kleinmanni* is known from the region.

### Collecting Sites:

1. Visitors Centre: 30°44'38"N 29°09'59"E Alt. 110m
2. North west of Core Zone: 30°46'06"N 29°11'41"E Alt. 31m
3. West of Core Zone (100 m south of site [2])
4. El-Gabbasat 1: 30°44'52"N 29°11'25"E Alt. 90m
5. El-Gabbasat 2: 30°44'50"N 29°11'25"E Alt. 90m
6. Southern border of the Protectorate: 30°44'02"N 29°11'00"E Alt. 103m
7. Dry low area with small adjacent sand dunes: 30°48'29"N 29°11'32"E Alt. 16m
8. Khashm El-A'eish west of Visitors Centre: 30°44'18"N 29°08'24"E Alt. 90m
9. Northern Slope of Khashm El-A'eish
10. Eastern border of the Protectorate: 30°46'20"N 29°17'16"E - 30°45'95"N 29°17'24"E Alt. 53m
11. Military watching point upon Khashm El-A'eish: 30°45'32"N 29°12'22"E

### I. Order Araneida

Spiders of fourteen families were collected from the eleven studied sites. The identification of the collected specimens with their numbers, sites and months of collecting are included in Table 1.

Table 1: Spiders collected from Omayed protectorate.

\* = Specimens collected by other colleagues on February 1998.

Family	Species	Specimens	Sites	Months
Agelenidae	<i>Benoitia lepida</i>	1♂, 6♀, 5j	2,7,9	Aug, Oct
Clubionidae	<i>Clubiona</i> ? sp.	1♂	1	Oct
Dysderidae	<i>Dysdera</i> sp. *	1♂	9	Feb
Filistatidae	? sp. *	1♀	9	Feb
Gnaphosidae	<i>Micaria</i> sp.	1♀	10	Oct
	<i>Poecilochroa senilis</i>	2♂	2	Aug
	<i>Pterotricha schaefferi</i>	1♂, 5♀, 1s♂, 12j	1-5,7,8,10,11	Aug, Oct
	<i>Zelotes</i> ? sp.	1s♀, 4j	3,8-10	Oct
	? sp. (~ 5 spp.)	9j	3,5,8,10	Aug, Oct
Lycosidae	? sp. (3 spp.)	1♂, 1♀, 9j	1-5,8,10	Aug, Oct
Oecobiidae	<i>Oecobius</i> sp.	1j	1	Aug
Oxyopidae	<i>Oxyopes</i> sp.	1♂, 8♀	2,4	Aug
Philodromidae	<i>Thanatus</i> sp.	1j	10	Oct

Salticidae	<i>Menemerus animatus</i>	1♂	1	Aug
	<i>Mogrus fulvovittatus</i>	1♀	3	Aug
	? sp. (~ 4 spp.)	9j	1,5,6,8,11	Aug, Oct
Sicariidae	<i>Loxosceles</i> sp.	9j	5-8,10	Aug, Oct
Theridiidae	<i>Steatoda ephippiata</i>	1♀	5	Aug
Thomisidae	<i>Thomisus</i> sp.	3j	3,4,6	Aug, Oct
	<i>Xysticus</i> sp.	1s♂, 4j	6-8,11	Aug, Oct
Zodariidae	? sp.	3s♂, 1s♀	4,7-9	Aug, Oct

## II. Order Pseudoscorpionida

Six specimens, 3♂, 3♀, of *Olpium kochi* Simon, 1881, Family Olpiidae, were collected on August from collecting sites 3 and 7, and one male specimen of the same species was collected on October from collecting site 10. Most specimens were found under stones. Only one specimen was found under bark and another walking on sand.

## III. Order Scorpionida

Four scorpion species of family Buthidae were recorded during this preliminary survey; 1. *Androctonus australis*, 8 specimens from sites 1,3-6 on August and 29 specimens from sites 2,3,5,8-11 on October. 2. *Buthacus leptochelys*, 6 specimens from sites 1-3,6 on August and 1 specimen from site 8 on October. 3. *Leiurus quinquestriatus*, 1 specimen from site 1 on August and 1 specimen from site 8 on October. 4. *Orthochirus innesi*, 5 specimens from sites 7,8 on August and 3 specimens from sites 5,8,10 on October.

All specimens were almost found under stones and sometimes under cement paper bag (collecting sites 2 and 3) except a specimen of *A. australis* was found at night inside a building and two specimens of *B. leptochelys* were collected using Ultra Violet light at night (in collecting site 1 on August).

Ethological observation: When two big scorpions of *A. australis* were kept together, each one firmly grasped the metasoma of the other between the fifth metasomal segment and telson using its pedipalps and did not release it for hours. Leaving them together overnight, one killed the other by amputating the two pedipalps and the first and second pairs of legs, and devouring a small part of the prosoma including the victim's chelicerae. The same behaviour was repeated by two small scorpions of the same species when they were kept together as an experiment.

### B. Burullus Protectorate

Lake Burullus was declared as protected area by the Prime Ministerial Decree No. 1444 for 1998. Its area is about 460 km<sup>2</sup>. Type: Wetlands protected area.

Lake Burullus, the second largest natural lake in Egypt, has a wide diversity of various wetland habitats, ranging from fresh water swamps and reed beds in the south, to salt marshes and mudflats in the north. Sand dunes, rich in flora, dominate the sand bar separating the lake from the sea. The marine environment is represented along with sandy beach habitat, and the exchange between the brackish lake and marine waters provide a unique ecotonal zone where many marine and aquatic organisms proliferate. Burullus is by far the least disturbed and polluted of the Delta wetlands and its environs still retain some aspects of wilderness, which have been lost throughout most of the Delta. About 135 plant species have been recorded from this area. Because of its relative isolation, Burullus is also an important breeding site for several water birds and wetland species.

About 35 species of birds are known to breed at Burullus. The Mediterranean shore of the lake is of potential importance for breeding endangered marine turtles, *Carreta carreta* and *Chelonia mydas*. The Jungle Cat *Felis chaus* is known to exist in considerable numbers.

#### Collecting Sites:

1. West of Borg El-Burullus: 31°34'34"N 30°57'51"E
2. West of El-A'aqla: 31°31'39"N 30°49'00"E
3. Near El-Maqsaba: 31°29'47"N 30°46'06"E
4. Near Mastaroah: 31°28'30-55"N 30°41'02-15"E
5. Near El-Tolombat: 31°30'51"N 31°03'51"E
6. Near Shabab El-Kharrigeen: 31°26'14"N 30°30'31"E
7. El-Kom El-Akhdar Island: 31°26'58"N 30°49'24"E
8. Desheema Island: 31°25'00"N 30°40'09"E

### I. Order Araneida

Spiders of nine families were collected from the eight sites studied during September 2000. The identification of the collected specimens with their numbers and sites of collecting are included in Table 2.

Table 2: Spiders collected from Burullus Protectorate.

Family	Species	Specimens	Sites
Agelenidae	<i>Lycosoides</i> sp.	2j	7
Araneidae	<i>Agalenatea</i> ? sp.	2♀	4
	<i>Argiope lobata</i>	1♀	6
	<i>Argiope trifasciata</i>	1♀	5,7
	<i>Cyclosa insulana</i> ?	2s♂, 1♀, 2j	4
	? sp. (2 spp.)	1♀, 1j	5,7
Eresidae	<i>Stegodyphus lineatus</i>	3♀, 1j	7
Gnaphosidae	<i>Pterotricha conspersa</i>	1♂, 5♀, 8j	1,2,4,8
	? sp	1j	4
Lycosidae	? sp.	1♀	8
Miturgidae	<i>Cheiracanthium canariense</i>	3♀	7
Philodromidae	? sp.	1 j	3
Salticidae	<i>Mogrus fulvovittatus</i>	5♀	1,3,4
	? sp. (3 spp.)	1♂, 1♀, 6j	1,2,7
Theridiidae	<i>Steatoda paykulliana</i>	1s♀	2
	? sp. (2 spp.)	2j	7

### II. Order Pseudoscorpionida

Only one male specimen of *Olpium kochi*, Family Olpiidae, was collected from collecting site 2 (west of El-A'aqla village). It was found under cement paper bag, directly on sand.

### III. Order Scorpionida

Seven specimens of only one species, *Androctonus amoreuxi*, of Family Buthidae were collected on September from collecting site 2 (west of El-A'aqla village). All

scorpions were almost found under cement paper bags and carton paper, sometimes hidden among paper layers.

#### IV. Order Solpugida

Only one juvenile specimen of *Biton* sp., Family Daesiidae, was collected from collecting site 7 (El-Kom El-Akhdar Island). It was found under a stone among plants.

#### C. Zaranik Protectorate

Zaranik was declared as protected area by the Prime Ministerial Decree No. 1429 for 1985. Its area is about 250 km<sup>2</sup>. Type: Wetland protected area of importance for birds.

Zaranik is internationally renowned as an important bottleneck and staging area for hundreds of thousands of migrant Palaearctic water birds. More than 270 species of birds have been recorded in the area, including Pelican, Herons, Crested Lark, Quail, White Stork and Falcons. Three globally threatened bird species occur regularly: Corncrake *Crex crex*, Pallid Harrier *Circus macrourus* and Black-winged Pratincole *Glareola nordmanni*. Large numbers of Flamingo *Phoenicopterus ruber* also winter at Zaranik. Two species of threatened marine turtles are known to breed locally: Loggerhead Turtle *Carretta carretta* and Green Turtle *Chelonia mydas*. The endangered *Dermochelys coriacea* has also been recorded. Islets and littoral dunes fringing the southern margins of the Zaranik Lagoon and adjacent "sabkha" (marshy area) are thought to hold small populations of the threatened Egyptian Tortoise *Testudo kleinmanni*. The threatened Fennec Fox *Vulpes zerda* and the rare Sand Cat *Felis margarita* also occur in small numbers. Lake Bardawil and the Zaranik Lagoon are important artisan and commercial fishery.

#### Collecting Sites:

1. Visitors Centre: 31°04'34"N 33°27'57"E
2. North east of Visitors Centre: 31°04'39"N 33°28'08"E Alt. 24m
3. North west of Visitors Centre: 31°04'39"N 33°27'47"E Alt. 22m
4. Fishers Village: 31°08'05"N 33°28'18"E
5. Sand Bar between lake and sea: 31°08'32"N 33°28'39"E
6. Islet 1: 31°09'03"N 33°27'15"E
7. Islet 2: 31°08'25"N 33°28'03"E
8. El-Mahasna Island: 31°10'06"N 33°20'54"E
9. El-Matli Island: 31°06'34"N 33°26'22"E
10. El-Flousiyat Island 1: 31°07'04"N 33°26'11"E Alt. 15m
11. El-Flousiyat Island 2: 31°07'05"N 33°26'21"E Alt. 13m
12. El-Flousiyat Island 3: 31°07'13"N 33°26'13"E Alt. 16m
13. El-Khoweinat: 31°06'15"N 33°24'33"E Alt. 20m
14. Abu El-Husein: 31°04'26"N 33°30'39"E
15. Abu Madi (Zakar Madi, Abu Aarada): 31°02'48"N 33°23'47"E Alt. 14m
16. Observation centre: 31°07'03"N 33°29'55"E
17. East of main entrance: 31°04'11"N 33°27'43"E

#### I. Order Araneida

Spiders of twenty-three families were collected from the seventeen studied sites. The identification of the collected specimens with their numbers, sites and months of collecting are included in Table 3.

Table 3: Spiders collected from Zaranik Protectorate.

\* = Specimens collected by another colleague on August and September 2003.

Family	Species	Specimens	Sites	Months
Agelenidae	<i>Benoitia lepida</i>	4♂, 20♀, 1s♂, 1s♀, 12j	1-3,11, 14,15	Apr-Aug, Oct, Nov
Araneidae	<i>Argiope lobata</i>	2♀	6,10	Aug, Oct
	<i>Argiope</i> sp.	2j	2	Jun, Aug
	<i>Cyclosa</i> sp.	7j	2,3	May-Jul, Oct
	? sp.	5j	5,6,14	Jul-Oct
Eresidae	<i>Stegodyphus lineatus</i>	1♂, 6♀, 2s♀, 4j	2,3,14	Apr, Jun-Aug, Oct
Filistatidae	? sp.	3j	14,15	Sep, Oct
Gnaphosidae	<i>Micaria</i> sp. *	1♀	14	Sep
	<i>Pterotricha lesserti</i>	15♂, 3♀, 11j	1-3,5,8, 10,13,17	Apr-Aug, Oct, Nov
	<i>Zelotes</i> sp.	3♂, 5♀, 2s♂, 1s♀, 8j	2,3,6,7,10, 13,14,17	May, Jul, Aug, Sep-Nov
	? sp. (6 spp.)	2♂, 6♀, 1s♀, 18j	1-3,6,10, 14,15,17	Apr-Aug, Oct
Linyphiidae	? sp.	1♀	3	Nov
Liocranidae ?	? sp. (2 spp.)	20♂, 11♀, 2s♂, 9j	1-3,5,14	May, Jul, Aug, Oct, Nov
Lycosidae	? sp. (~ 4 spp.)	11♂, 12♀, 4s♂, 1s♀, 25j	1-8,14, 15,17	Apr, May, Jul, Aug-Nov
Mimetidae	<i>Mimetus</i> sp. *	1♂	14	Aug
Miturgidae	<i>Cheiracanthium canariense</i>	1♂, 3♀, 2j	2,14,16	Jul, Aug, Nov
	<i>Cheiracanthium</i> sp.	3♀, 5j	2,6,14	Apr, May, Jul- Oct
Nemesiidae ?	? sp.	1j	3	Oct
Oonopidae ?	? sp.	1♂	1	Aug
Oxyopidae	<i>Oxyopes</i> sp.	3j	3,14	May, Aug, Sep
Philodromidae	<i>Ebo</i> sp.	1♂	3	Aug
	<i>Philodromus</i> ? sp.	3♂, 2j	2,14,17	May, Aug, Sep
	<i>Thanatus</i> sp.	2♂, 1♀, 2j	2,3,14	Jul-Sep
	? sp.	1j	14	Jul
Pholcidae	? sp.	1♂, 4♀, 4j	1,2,3,14	May, Jun, Aug, Sep, Oct
Salticidae	<i>Heliophanus decoratus</i>	2♂, 1♀, 1j	2,5,6,14	Aug-Oct
	<i>Menemerus animatus</i>	7♂, 3♀, 1s♀, 2j	1,13	Jun-Sep, Nov
	<i>Mogrus fulvovittatus</i>	1♂, 21♀, 2j	2,3,5,7, 11,14,16	Apr-Aug, Oct, Nov
	<i>Myrmarachne tristis</i> *	1♂	14	Aug
	<i>Plexippus paykulli</i>	4♀, 2s♂, 1j	1	Jun, Sep, Nov
	? sp. (~ 4 spp.)	5♀, 1s♂, 14j	1-7,9,10,17	May, Jul-Nov
Scytodidae	<i>Scytodes</i> sp.	5j	1,15	May, Oct, Nov
Sparassidae	<i>Cerbalus psammodes</i>	2♂	1	Apr, Jun
	? sp.	2j	1,15	May, Nov
Tetragnathidae	? sp. (2 spp.)	1s♂, 7j	1,9	Aug, Oct

Theridiidae	<i>Latrodectus pallidus</i> *	1♀	14	Aug
	<i>Paidiscura dromedaria</i> *	1♀	14	Aug
	<i>Steatoda ephippiata</i>	1♀	1	Jul
	<i>Steatoda paykulliana</i>	1s♂, 1s♀, 1j	8	Nov
	<i>Steatoda triangulosa</i>	1♂, 10♀, 2j	1	Apr, Jun, Sep, Nov
	<i>Steatoda</i> sp.	1j	3	May
	<i>Theridion melanostictum</i>	1♂, 1♀	1	Oct
	<i>Theridion</i> sp.	4♀	14	Jul
	? sp. (3 spp.)	4♀, 2s♂, 3j	1,3,8,12-14	May, Jul-Sep, Nov
Thomisidae	<i>Thomisus onustus</i>	1♀, 1s♀, 1j	2,3	Jul, Aug
	<i>Thomisus spinifer</i> *	1♂	14	Aug
	<i>Xysticus</i> sp.	1j	10	Aug
Uloboridae	<i>Uloborus walckenaerius</i>	2♀, 2j	2,14	Jul, Aug, Oct
Zodariidae	<i>Lachesana perversa</i>	2♂	17	May
	<i>Zodarion</i> sp.	1♂, 2♀, 4j	1,15	May, Jul, Sep, Oct

## II. Order Pseudoscorpionida

Ten specimens, 4♂, 5♀, 1j, of *Olpium kochi*, Family Olpiidae, were collected on May, August, and October from collecting sites 3,4,9,11,13 and 15 from under stones and rarely in pitfall traps. Five female specimens of *Minniza* sp., Family Olpiidae, were collected on October and November from collecting sites 2, 6 and 8 from under stones or wet algae remnants (site 8). Four specimens, 1♂, 2♀, 1j, of *Rhacochelifer* ? sp., Family Cheliferidae were collected on May and November from collecting sites 2,15 and 17 from under stones.

## III. Order Scorpionida

Two scorpion species of Family Buthidae were recorded during this preliminary survey. 1. *Androctonus bicolor*, 4 specimens from site 10 on August and 2 specimens from sites 1,10 on October. 2. *Buthacus leptochelys*, 2 specimens on August and 5 specimens on October from sites 1,10. All specimens were found under stones or in big pitfall traps in collecting sites. Only one specimen of *A. bicolor* was found at night inside a building on October.

## IV. Order Solpugida

Only one male specimen of *Biton ehrenbergi* Karsch 1880, Family Daesiidae, was collected (light attracted) from collecting site 1 on July.

## D. Ahrash Protectorate

El-Ahrash (near Rafah) was declared as protected area by the Prime Ministerial Decree No. 1429 for 1985. Its area is about 8 km<sup>2</sup>. Type: Developing resources protected area.

An area of high coastal dunes, about 60m of the sea level, that has good vegetation cover. *Acacia* trees have been planted in order to stabilize the dunes and curb sand movement in the region. The vegetation of the area, despite being heavily



manipulated by man and contains several introduced elements, provides a good example of how plant life can flourish if unmolested. The vegetation of the area provides grazing and firewood to local inhabitants, but overuse is threatening to degrade and destroy this resource. Several rare, endemic and restricted animals and plants occur in the region, some of which are likely to occur in this protected area, and benefit from its conservation status.

### Collecting Site:

- Visitors Centre: 31°18'21.1"N 34°12'56.6"E Alt. 48m

## I. Order Araneida

Spiders of five families were collected from the protectorate. The identification of the collected specimens with their numbers and month of collecting are included in Table 4.

Table 4: Spiders collected from Ahrash Protectorate.

Family	Species	Specimens	Months
Araneidae	? sp.	1j	Nov
Gnaphosidae	<i>Pterotricha lesserti</i>	1♀, 1s♂, 6j	Oct, Nov
	<i>Zelotes</i> sp.	1♂, 1j	Oct, Nov
Philodromidae	<i>Thanatus</i> sp.	7j	Nov
Theridiidae	? sp.	1j	Oct
Thomisidae	<i>Xysticus tristrami</i>	1♂, 1♀, 1s♀	Nov

## Discussion

Arachnids were studied for the first time in the Mediterranean protected areas of Egypt. All species, with few exceptions, were recorded for the first time from these areas (El-Hennawy 2002c).

**Spiders:** Among the 603 collected spiders, only 27 species and 36 genera could be identified. They belong to 27 families. The identified spider species are alphabetically arranged in the following list:

*Argiope lobata* (Pallas, 1772)  
*Argiope trifasciata* (Forskål, 1775)  
*Benoitia lepida* (O.P.-Cambridge, 1876)  
*Cerbalus psammodes* Levy, 1989  
*Cheiracanthium canariense* Wunderlich, 1987  
*Cyclosa insulana* (Costa, 1834)  
*Heliophanus decoratus* L.Koch, 1875  
*Lachesana perversa* (Savigny, 1825)  
*Latrodectus pallidus* O.P.-Cambridge, 1872  
*Menemerus animatus* O.P.-Cambridge, 1876  
*Mogrus fulvovittatus* Simon, 1882  
*Myrmarachne tristis* (Simon, 1882)  
*Paidiscura dromedaria* (Simon, 1880)  
*Plexippus paykulli* (Audouin, 1825)  
*Poecilochroa senilis* (O.P.-Cambridge, 1872)  
*Pterotricha conspersa* (O.P.-Cambridge, 1872)  
*Pterotricha lesserti* Dalmás, 1920

*Pterotricha schaefferi* (Audouin, 1825)  
*Steatoda ephippiata* (Thorell, 1875)  
*Steatoda paykulliana* (Walckenaer, 1805)  
*Steatoda triangulosa* (Walckenaer, 1802)  
*Stegodyphus lineatus* (Latreille, 1817)  
*Theridion melanostictum* O.P.-Cambridge, 1876  
*Thomisus onustus* Walckenaer, 1805  
*Thomisus spinifer* O.P.-Cambridge, 1872  
*Uloborus walckenaerius* Latreille, 1806  
*Xysticus tristrami* (O.P.-Cambridge, 1872)

The percentage of collected specimens of every spider family from the four areas is calculated (Table 5). Gnaphosidae is at the summit of number of individuals collected from the four studied protected areas. At the second position: Salticidae, Lycosidae and Agelenidae in Omayed and Zaranik; Salticidae and Araneidae in Burullus; and Philodromidae in Ahrash.

Table 5. Percentage of collected specimens of every spider family from the four areas.

Family	Omayed	Burullus	Zaranik	Ahrash
Agelenidae	11.32	3.77	9.00	
Araneidae		20.75	3.79	4.54
Clubionidae	0.94			
Dysderidae	0.94			
Eresidae		7.55	3.08	
Filistatidae	0.94		0.71	
Gnaphosidae	33.96	28.30	18.01	45.45
Linyphiidae			0.24	
Liocranidae ?			9.95	
Lycosidae	10.38	1.89	12.56	
Mimetidae			0.24	
Miturgidae		5.66	3.32	
Nemesiidae ?			0.24	
Oecobiidae	0.94			
Oonopidae ?			0.24	
Oxyopidae	8.49		0.71	
Philodromidae	0.94	1.89	2.84	31.82
Pholcidae			2.13	
Salticidae	10.38	24.53	16.35	
Scytodidae			1.18	
Sicariidae	8.49			
Sparassidae			0.95	
Tetragnathidae			1.89	
Theridiidae	0.94	5.66	8.29	4.54
Thomisidae	7.55		1.18	13.64
Uloboridae			0.95	
Zodariidae	3.77		2.13	

Mygalomorph spiders appeared once in Zaranik; only one juvenile Nemesiidae ?. The most significant species are those of the gnaphosid genus *Pterotricha*. Three species of this genus are represented in the four areas; *P. schaefferi* in Omayed, *P. conspersa* in

Burullus, and *P. lesserti* in both Zaranik and Ahrash. Also, the theridiid genus *Steatoda* is represented by three species in three areas; *S. ephippiata* in Omayed, *S. triangulosa* in Zaranik, and *S. paykulliana* in both Burullus and Zaranik. *S. ephippiata* is recorded in Egypt only from Mid Sinai (El-Hennawy 2002a, 2002b). This record from Omayed widens its range of distribution in Egypt from East to West.

*Cerbalus psammodes*, Family Sparassidae, is a new record from Egypt. *Latrodectus pallidus*, Family Theridiidae, is here recorded for the first time from North Sinai. It is known from Nabq protectorate, South Sinai (El-Hennawy 2002a, 2003). The first Egyptian male *Mimetus* specimen, Family Mimetidae, was collected from Zaranik. *Cheiracanthium canariense*, Family Miturgidae, was discovered for the first time from Egypt during this study (El-Hennawy 2002a). This species was only known from Canary Islands.

Zaranik has the highest diversity of spider species. This is related to the diversity of insects. El-Moursy et al. (2001) recorded 187 species and subspecies, belonging to 49 families of 15 orders, of insects from Zaranik protectorate. There are many other unidentified species of insects there.

**Pseudoscorpions:** Three species of pseudoscorpions were recorded during this study from three areas. *Olpium kochi* Simon 1881, Family Olpiidae, is the mostly encountered species in Omayed, Burullus and Zaranik. *O. kochi* is known in Egypt from Wadi Natron, Cairo, Assuan and Wadi El-Raiyan (El-Hennawy 1988, 1991). The second olpiid species, *Minniza* sp., and *Rhacochelifer* ? sp. of Family Cheliferidae were only found in Zaranik.

**Scorpions:** Six scorpion species were encountered during the survey. All of them belong to Family Buthidae (Table 6).

Table 6: Scorpions recorded from three protectorates with the number of specimens.

Species	Omayed	Burullus	Zaranik
<i>Androctonus amoreuxi</i> (Audouin 1825)		7	
<i>Androctonus australis</i> (Linnaeus 1758)	37		
<i>Androctonus bicolor</i> Ehrenberg 1828			6
<i>Buthacus leptochelys</i> (Ehrenberg 1829)	7		7
<i>Leiurus quinquestriatus</i> (Ehrenberg 1828)	2		
<i>Orthochirus innesi</i> Simon 1910	8		

Genus *Androctonus* Ehrenberg 1828 is represented in this study by three species, each of them in only one protected area. *A. amoreuxi* is only found in Burullus. This species is widely distributed in Egypt and is already recorded from many regions including Baltim near Burullus Lake (El-Hennawy 1992). *A. australis* is only found in Omayed. It is known from Mersa Matrouh and Sallum, west of this area. *A. bicolor* is only found in Zaranik. It is known before from Mersa Matrouh to Alexandria and Sinai. *Buthacus leptochelys* is found in both Omayed and Zaranik. It is known from the Mediterranean coastal strip including Alexandria to Port Said and Sinai. Both *Leiurus quinquestriatus* and *Orthochirus innesi* are only found in Omayed. *L. quinquestriatus* is recorded from Mersa Matrouh and *Orthochirus* species are known from the region of Sallum. Omayed has the highest diversity of scorpions among the four studied areas. The ethological observation recorded between two *A. australis* scorpions means that there is no specific tolerance in this species while the seven specimens of *A. amoreuxi* from Burullus were kept together without cannibalism for about a week.

**Sun-Spiders:** Sun-spiders were only recorded from Burullus and Zaranik. The same genus, *Biton* Karsch 1880, was recorded. This genus is widely distributed in Egypt and *Biton ehrenbergi* Karsch 1880 is known in Egypt from Cairo, El-Fayum, Luxor, and Elephantine (Assuan) (El-Hennawy 1998). It is its first record from northern Sinai. This study leads us to state that it is necessary to make continuous seasonal survey of all arachnid species in the coastal protected areas of Egypt to elucidate their importance in their environment. A thing that enables the monitoring of these species in relation to the environmental changes which affect them in these areas.

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